HIGHLY IONIZED SPECTRA OF THE INERT GASES

BY

WILLIAM LOCKWOOD PARKER

B.A., Reed College, 1936
A.M., University of Illinois, 1938

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN PHYSICS IN THE GRADUATE SCHOOL OF THE UNIVERSITY OF ILLINOIS, 1941

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HIGHLY IONIZED SPECTRA OF THE INERT GASES

A new method for the excitation of high stages of ionization of the inert gases has been developed. The method uses a vacuum spark, such as is ordinarily used for the excitation of spectra of other highly-ionized elements. A small hole is drilled axially in the lower electrode, and the gas to be excited is fed into the bottom of this hole through a fine capillary from a reservoir in which the gas is kept at a pressure of the order of 20mm of Hg. The gas feeds out into the space between the electrodes and is ionized by the spark.

Radiations from highly ionized argon and neon were photographed with a 21-foot grazing incidence vacuum spectrograph. Some 120 new lines have been identified giving about 80 new energy levels in argon V, VI, VII, and VIII. In addition the principal multiplets of argon IX and neon VII and VIII have been identified.

Various figures and tables are given to illustrate the behavior of the constant first and second difference laws and the regular doublet law for the various isoelectronic sequences. The new data reported here obey these laws very well.

VITA

William Lockwood Parker was born July 18, 1915 in Portland, Oregon and received his primary and secondary education in the public schools of that city. He attended Reed College, receiving the Bachelor of Arts degree in 1936. From 1936 to the present date he has been employed as a part-time assistant in the Physics department of the University of Illinois, at the same time doing graduate work in Physics. In 1938 he received the Master of Arts degree in Physics from the University of Illinois.